CLAIMS

1. Bone implant (10) suitable for implantation in an implantation direction parallel to an implant axis (I) in a cavity surrounded by a cavity wall (K) of bone tissue (3), wherein an implant portion to be implanted comprises surface ranges (16) of a material, which is liquefiable (M) by mechanical oscillation, or such surface ranges (16) formed by pressing the liquefiable material out of a hollow space (26) in the implant through openings (27), characterized in that the implant portion to be implanted further comprises cutting edges (14), which cutting edges are located outside the surface ranges (16) provided or to be created, which cutting edges do not extend in a common plane with the implant axis (I), which cutting edges are facing toward a distal end region of the implant, and which cutting edges extend at least partly around the circumference of the implant.

2. Bone implant according to claim 1, characterized in that the cutting edges (14) comprise a wedge angle (ß) of less than 90°.

3. Bone implant according to claim 1 or 2, characterized in that the cutting edges (14) are designed to be salient.

4. Bone implant according to any one of claims 1 to 3, characterized in that the cutting edges (14) are undercut to form a chip space (23).

5. Bone implant according to any one of claims 1 to 4, characterized in that the liquefiable material (M) is situated in depressions (40) and the surface ranges

(16) of the liquefiable material (M) protrude from surface areas (17) surrounding the depressions (40).

6. Bone implant according to any one of claims 1 to 4, characterized in that the openings (27) lead into the depressions (40).

7. Bone implant according to claim 5 or 6, characterized in that the depressions (40) are grooves extending axially or spirally across the implant region to be implanted.

8. Bone implant according to any one of claims 1 to 7, characterized in that osseointegrative surface areas (17) are situated between the surface ranges (16) of the liquefiable material.

9. Bone implant according to any one of claims 1 to 8, characterized in that the implant portion to be implanted further comprises axially extending furrowing or tapping structures (21).

10. Bone implant according to any one of claims 1 to 9, characterized in that the cutting edges (14) extend along parts of the circumference of the implant and form lower edges of scale-like structures.

11. Bone implant according to any one of claims 1 to 10, characterized in that a proximal end region of the implant comprises a collar (31) with a lower edge fashioned as a cutting edge.

12. Bone implant according to any one of claims 1 to 11, characterized in that the proximal end region comprises a ring (32) of a thermoplastic material.

13. Bone implant according to any one of claims 1 to 12, characterized in that the implant portion to be implanted is of a shape tapering towards a distal end region.

14. Bone implant according to claim 13, characterized in that it comprises steps (13) extending wholly or partly around the implant and comprising at least partially edges fashioned as cutting edges (14).

15. Bone implant according to claim 14, characterized in that a part of the steps (13) have blunt edges with a wedge angle (ß) of 90° or more.

16. Bone implant according to any one of claims 1 to 12, characterized in that the implant portion to be implanted is essentially cylindrical and comprises cutting edges (14) protruding from the cylindrical form and being distanced from the implant axis (I) by distances which decrease in the direction of implantation.

17. Bone implant according to claim 16, characterized in that the cutting edges (14) protruding from the cylindrical form extend along a part of the implant's circumference and are aligned in series in axial direction.

18. Bone implant according to claim 17, characterized in that it comprises at least two series of cutting edges (14, 14', 14") facing each other, and that the surface

ranges (16) of the liquefiable material (M) or outlets of the openings (27) are situated between the series on the implant's circumference.

19. Bone implant according to any one of claims 1 to 18, characterized in that it comprises a hollow space (26) and a piston (42) which is insertable into a proximal opening of the hollow space (26).

20. Bone implant according to the claim 19, characterized in that on a proximal end (43) of the piston (42) and/or round the proximal opening of the hollow space (26), means for an insulating connection between piston (42) and implant are provided.

21. Bone implant according to any one of claims 1 to 20, characterized in that it carries an intermediate element (52) on a proximal end region.

22. Bone implant according to claim 21, characterized in that the intermediate element (52) is connected to the implant by a loose fit connection and/or is equipped to be joined to a sonotrode (53) via a loose fit connection.

23. Bone implant according to any one of claims 1 to 22, characterized in that it is a dental implant (10).

24. Bone implant according to claim 23, characterized in that it comprises, in addition to a root portion (11), a crown portion (12), an abutment (30) or means (20) for fastening an abutment, a crown (19), a bridge or a set of dentures.

25. Bone implant according to any one of claims 1 to 22, characterized in that it is the shaft of a joint prosthesis.

26. Bone implant according to any one of claims 1 to 22, characterized in that it is designed to bridge a bone defect.

27. Implantation set comprising a bone implant according to any one of claims 1 to 26 and at least one processing tool (58), which is adapted in shape to the implant portion to be implanted, and/or an intermediate element (52), which is adapted in shape to a proximal end region of the implant.

28. Method for producing a bone implant according to any one of claims 1 to 26, which bone implant is implanted in a cavity as a substitute for a part of a bone or a tooth, which cavity is pre-given or is to be created and has an osseous cavity wall (K), wherein the method comprises a measuring step in which the bone part or tooth (1) to be substituted and/or the pre-given cavity, or a given bone structure in the area of the cavity to be created, are measured to generate measuring data imaging the bone part, the tooth (1), the cavity, or the bone structure, a data processing step in which the measuring data are processed, and a production step in which the bone implant (10) is produced based on the processed measuring data, characterized in that in the data processing step, the implant portion to be implanted is equipped with cutting edges (14) being dimensioned in such a way that they are at least partly lodged in the cavity wall after implantation, and with structures to receive portions of the liquefiable material (M).

29. Method according to claim 28, characterized in that, in the measuring step, a three-dimensional image or one or several two-dimensional images are recorded.

30. Method according to claim 28 or 29, characterized in that, in the data processing step, a hollow space (26) and openings (27) connecting the surface of the implant portion to be implanted with the hollow space (26) are constructed.

31. Method according to any one of claims 28 to 30, characterized in that, in the data processing step, axially extending furrowing or cutting structures (21) are constructed on the implant portion to be implanted, which structures are dimensioned in such a way that they reach at least partially into the cavity wall after implantation.

32. Method according to any one of claims 28 to 31, characterized in that, in the data processing step, additional data are produced for the production of a processing tool (58) adapted to the implant portion to be implanted.

33. Method according to any one of claims 28 to 32, characterized in that, in the data processing step, additional data are produced for the production of an intermediate element (52) adapted to the proximal end region of the implant.

34. Method according to any one of claims 28 to 33, characterized in that, in the data processing step, structures with an osseointegrative effect are constructed.

35. Method according to any one of claims 28 to 34, characterized in that the bone implant is a dental implant (10), and that the tooth (1) to be substituted and/or the alveolus (57) are measured prior to extraction of the tooth (1) to be substituted.

36. Method for the implantation of a bone implant according to any one of claims 1 to 26, wherein the bone implant is positioned in a cavity, which is pre-given or to be created and has an osseous cavity wall, characterized in that on positioning the implant, the cutting edges (14) are lodged in the cavity wall (K), and that by impingement with mechanical oscillations at least a part of the liquefiable material (M) liquefies and is pressed into the cavity wall.

37. Method according to claim 36, characterized in that for the impingement of the implant with mechanical oscillations the implant is coupled to an excited element in such a way that of the oscillations only those components pushing the implant into the cavity are transmitted to the implant.

38. Method according to the claim 37, characterized in that the exciting element is a sonotrode (53) of an ultrasonic device or an intermediate element (52) which is able to be coupled to the sonotrode (53).

39. Method according to any one of claims 36 to 38, characterized in that the implant comprises surface ranges (16) of the liquefiable material and that the implant is positioned in the cavity by means of mechanical oscillations.

40. Method according to any one of claims 36 to 38, characterized in that the implant comprises a hollow space (26), in which the liquefiable material (M) is

positioned or is able to be positioned, that the implant is positioned in the cavity without impingement by mechanical oscillations or with impingement by mechanical oscillations but not including the liquefiable material, and that then the liquefiable material positioned in the hollow space (26) is impinged by mechanical oscillations and pressed against the distal end of the implant.

41. Method according to claim 40, characterized in that prior to the impingement of the liquefiable material by mechanical oscillations and after positioning the implant in the cavity the position of the implant is checked and adjusted if necessary.

42. Method according to claim 40 or 41, characterized in that a piston (42) is used for the impingement and pressing of the liquefiable material and the piston (42) is then tightly connected with the implant by the effect of the mechanical oscillations.

43. Method according to any one of claims 36 to 42, characterized in that the implant is conical and comprises steps (13), and that, prior to the positioning of the implant, shoulders (13') adapted to the steps (13) are fashioned in the cavity wall (K).

44. Method according to claim 43, characterized in that, for fashioning the shoulders (13'), a processing tool (58) is used, which is adapted to the implant portion to be implanted.

45. Method according to any one of claims 36 to 44, characterized in that the bone implant is a dental implant (10) and that the implantation is performed immediately after extraction of the tooth (1) to be substituted.